

QUEENS COLLEGE
DEPARTMENT OF MATHEMATICS

Final Examination

$2\frac{1}{2}$ Hours

Mathematics 115

Spring 2015

Instructions: Answer all the questions. Show all work.

- 1) Write an equation of a line that passes through the midpoint between $A(-4, 10)$ and $B(4, 0)$ and is perpendicular to the line $y = 2x - 3$.
- 2) Sketch the graph of the line $5x - 4y = 20$ and label the x -intercept and y -intercept.
- 3) Solve for x algebraically: $3(-x + 2) - 5(x - 4) \leq 18$
- 4) Solve the following system:
$$\begin{cases} 7x - 9y = -41 \\ 5x + 6y = 8 \end{cases}$$
- 5) Factor completely: $3x^4y + 6x^3y - 12x^2y - 24xy$
- 6) Find the domain of $f(x) = \frac{\sqrt{x+2}}{x^2-16}$.
- 7) Perform the indicated operation and simplify: $\left(\frac{2x}{x+8} + \frac{4}{x-2}\right) \div \frac{30}{5x+40}$
- 8) Simplify and write with positive exponents only:
$$\frac{(2x^3y^{-1})^{-2}(8x^2y^3)^{\frac{1}{3}}}{(x^{-1}y^{-6})^{-\frac{1}{3}}}$$
- 9) Simplify: $(\sqrt{x-3})^2 - (\sqrt{x}-3)^2$
- 10) Divide using long division: $(x^4 + 2x^3 - 10x - 57) \div (x + 3)$
- 11) Given the quadratic function $f(x) = x^2 - 8x + 7$,
 - (a) find $f(x + h)$
 - (b) sketch the graph of $f(x)$

(continued on other side)

12) Perform the indicated operation and simplify: $5\sqrt{36m^2n^7} - 4m\sqrt{4n^7} + \sqrt{8n^3}$

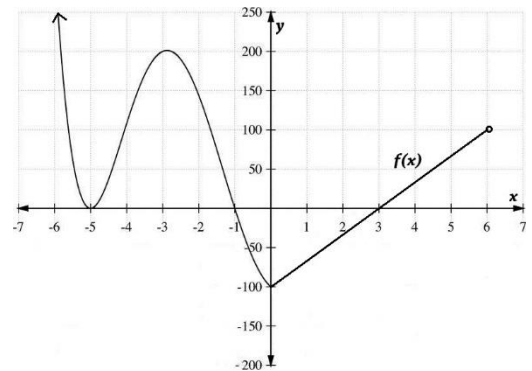
13) Solve for x : $x - 3\sqrt{x+2} = 2$

14) Simplify: $\frac{1 - \frac{12}{3x+10}}{x - \frac{8}{3x+10}}$

15) Solve for x : $\frac{2x}{x-5} - \frac{2x+1}{x+2} = \frac{3}{x+2}$

16) Use the graph of the function $f(x)$ show at the right to find

- (a) the domain of $f(x)$
- (b) the range of $f(x)$
- (c) the x -value(s) that satisfy $f(x) = 0$



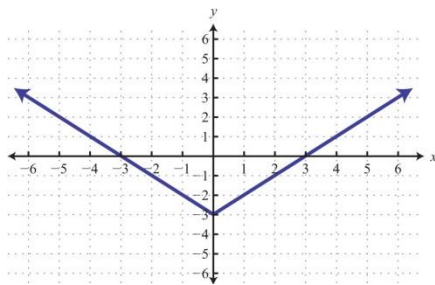
17) Rationalize and simplify: $\frac{4}{3-\sqrt{7}} + \frac{14}{\sqrt{7}}$

18) Find the center and radius of the circle with following equation: $x^2 + 10x + y^2 - 4y + 7 = 3$

19) Determine whether each of the following is a function. Explain your answer.

(a) $5x + y^2 = 81$

(b)



- 20) (a) Express the area of the shaded region shown to the right as a function of x .
 (b) Solve for x if the shaded region has an area of 320 ft^2 .

